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REVIEWS

Géosynclinaux et régions à tremblements de terre ("Geosynclines and Earthquake Regions"). By F. DE MONTESSUS DE BALLORE. Bulletin de la Société Belge de Géologie. Brussels, 1905. Pp. xviii+243–67.

This *mémoire* was read before the Société Belge de Géologie on December 20, 1904. The views presented are so suggestive that they are given here at some length, in order that the geologists of this country may promptly consider the theories advanced. M. de Ballore is well known as the compiler of the earthquake catalogue published in *Beiträge zur Geophysik*, Vol. IV, and the statistics have been turned to account in the article here mentioned. The author lays stress at the outlet upon the apparent influence of relief upon stability in the earth's crust, whether that relief be land or sea bottom. He then adds:

> The seismic description of the globe has afforded two general results of great importance. One of them, the independence of seismic and volcanic phenomena, was already suspected. The other and quite unexpected one was the grouping of the earthquake regions of the earth into two narrow zones lying along two great circles of the globe. This purely geometric relation demanded a geologic interpretation. It was found at once on the maps: *These zones embrace the earthquake regions which coincide exactly with the geosynclines of the secondary epoch,* as represented by M. Haug in his well-known *mémoire* on the geosynclines and the continental areas.
>
> Here is a general synthetic law clearly placing seismic phenomena under the direct control of the principal movements of the earth's crust, for it is along these lines that they have attained their greatest amplitude, both positive and negative. Depending entirely upon statistics and observations, and without the introduction of hypotheses, the law may be stated as follows:
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> The geosynclines, or the most yielding belts of the earth's crust where the sediments deposited to the greatest thickness have afterward, during the Tertiary epoch, been strongly folded and raised for the formation of the principal present chains or geanticlines, alone include, with only two or three doubtful exceptions, all the seismic regions. . . . .
>
> Seismic instability cannot be uniform along these belts on account of the nonsynchronism of the movements and of the differences of amplitude. They include here and there peneseismic, and sometimes even aseismic, regions, the reason for which may be found in the details of geologic history. . . . .

The folded structure of geosynclines is unstable, while the tabular structure of continental areas is stable, and probably always has been so. Such is the law suggested by looking over the surface of the globe. It is therefore proper to divide the subject into several paragraphs corresponding to the five continental areas and the geosynclinal areas whose limits may be taken as known from the work of M. Haug. These are as follows, with the number of quakes in percentages of the total:

		Number of Earthquakes	Per Cent.
I.	North Atlantic continent	8,939	5.21
II.	Sino-Siberian continent	3,479	2.03
III.	Australo-Indo-Malgache continent	374	0.22
IV.	Africano-Brazilian continent	457	0.27
V.	Mediterranean geosyncline	90,126	52.57
VI.	Circum-Pacific geosyncline	66,026	38.51
VII.	Pacific Ocean	2,033	1.19
	Total	171,434	100.00

The geosynclines thus include 91.09 per cent. of the earthquakes that have been reported, as against 8.92 per cent. only for the continental areas, and that, too, in spite of their much larger land surface.

It may be objected that seismic observations are not old and not sufficiently known, except only for the North Atlantic continent, and that consequently this enormous preponderance of seismicity in favor of the geosynclines is more apparent than real, and that it is misleading on account of the lack of information regarding other continental areas. To this it may be replied that the complexity of geographic and geologic conditions of the North Atlantic continent as compared with the other four is not inconsistent with the larger number of quakes observed in the former, namely, 5.21 per cent. as against 3.71 per cent. noted for the last four. And even if we do not wish to take this argument into account, it must be admitted that at most the five continental areas cannot furnish more than 25 per cent. of the earthquakes, which would reduce to 75 per cent. in place of 91.08 the seismicity of the geosynclines, as compared with 8.92 per cent. of the continental areas. . . . .

It is not expected that the seismic problem will be completely settled by means of this synthetic law. But it is an important result that we can affirm on the strength of statistics the close relation between earthquakes and the zones of the earth's crust where the folds have attained their greatest energy at the same time that the vertical movements have reached their greatest amplitude. . . . .

There follows a brief discussion of the several continental and geosynclinal areas as listed above. The "North Atlantic continent" is defined by him, for purposes of discussion, as comprehending the region lying between the Rocky Mountains and the Urals and north of the Alps and the Antilles. The "Sino-Siberian continent" lies between the Urals and the circum-Pacific and Mediterranean geosynclines. The "Australo-Indo-Malgache continent" is bounded on the east by the circum-Pacific geosyncline, on the north by the Mediterranean geosyncline, and on the west by the Mozambique channel. The "Africano-Brazilian continent" is spoken of as being astride of the South Atlantic and is bounded on the east by Mozambique, on the north by the Mediterranean, and on the west by the circum-Pacific geosyncline.

The Mediterranean geosyncline extends from Java and Sumatra across India, the Gulf of Persia, the Mesopotamian depression, southern Europe from the Caucasus to the Pyrennees, and the Mediterranean Sea to the Atlantic.

The circum-Pacific geosyncline extends from Cape Horn to Behring Strait and New Zealand, including the Antilles.

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STANFORD UNIVERSITY,
April 12, 1905.

Grundzüge der Gesteinskunde. Teil II, "Spezielle Gesteinskunde." By ERNST WEINSCHENK. Freiburg: Herdersche Verlagshandlung, 1905. Pp. 331, 8vo.

This work places in printed form a course of lectures given by Professor Weinschenk in the University of Munich, and designed to meet the needs of students already somewhat grounded in the general principles of petrology brought out in Part I, "Allgemeinen Gesteinskunde," which appeared several years ago. The volume is divided into three parts, treating respectively of the eruptive rocks, the sedimentary rocks, and the crystalline schists.

The eruptive rocks are treated in general according to the system of Rosenbush, each of the principal types being discussed in a very systematic manner under the following heads: (1) macroscopic characters; (2) mineral composition and structure; (3) chemical characters, and (4) occurrence and geological age.

The sedimentary rocks are treated under the usual divisions of mechanical, chemical, and organic sediments, and the principal types of rocks under each of these are quite fully discussed.

About thirty pages are devoted to the crystalline schists, the leading types being treated rather less systematically and in less detail than the types of eruptive rocks.